(*Pamphlet No. 59*)

TANGANYIKA
DEPARTMENT OF AGRICULTURE

Nineteenth Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi 1952

1954
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM
Price Shs. 1/75

COMMONWEALTH MYCOLOGICAL INST.
27 JUL 1954

(*Pamphlet No. 59*)

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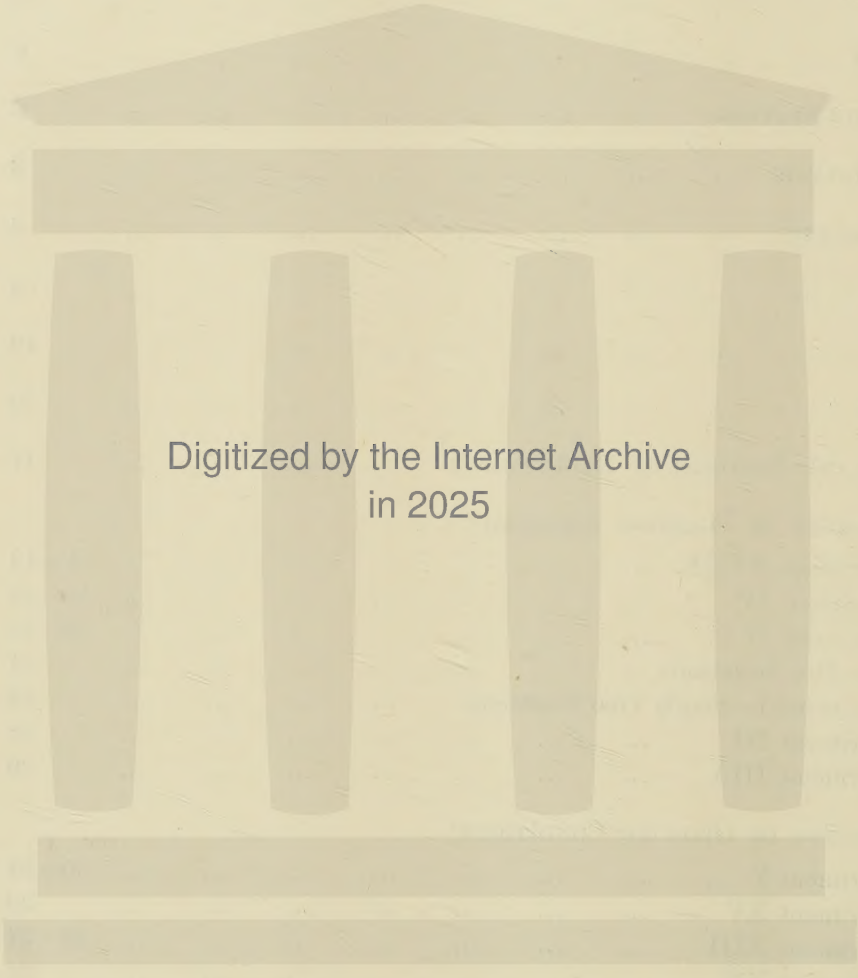

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COFFEE RESEARCH AND EXPERIMENTAL STATION, LYAMUNGU, MOSHI

Report for the period 1st January to 31st December, 1952

General

Taking the Station as a whole, the 1952 crop was a poor one, the overall average yield being only 2·98 cwt. of clean coffee per acre.

The generally low yields are attributable to the effect of two main factors, the exceptionally heavy crop in the 1951 season in many areas and the persistent rains of the period October, 1951 to March, 1952. In some areas the low yield was due to a combination of these two factors.

In cases where the yield in the 1951 season was exceptionally heavy, it resulted in a heavy drain on the trees reserves, so much so that the nutritional status necessary to flowering was not reached by March, 1952. In other instances, although the 1951 crop was within the capacity of the tree, the persistent rain from October, 1951 to March, 1952 caused the trees to dissipate their reserves in the production of excessive vegetative growth; the reserves were insufficient to produce the vegetative growth and, at the same time, mature the nodes to the degree necessary for flowering. The persistent rains also produced heavy weed growth which, owing to shortage of labour, could not be controlled in all areas; this, by limiting the availability of nutrients to the tree, still further restricted the possibilities of the production of flower.

Had a reasonably dry period occurred in January and February, it is possible that the vegetative growth would have been checked, the nodes might have matured, and flowering occurred. It is unlikely that the areas affected by the above factors could have borne a crop in excess of two to three cwt. per acre as an average, but some may have reached three to four cwt.

There were, however, areas which gave very good crops in 1952. In all of them, it must be admitted that the heavy weed factor was not operative, and their yields in 1951, although high, were not exceptionally so.

In Experiment XV, where irrigation and mulch are the treatments, the overall average in 1952 was 10·31 cwt. per acre with a corresponding figure of 8·64 cwt. for 1951, the nil treatment plots having given 7·31 cwt. and 7·95 cwt. in the respective years. In Experiment V the overall average yield was 13·02 cwt. in 1952 and 12·76 cwt. in 1951, with the nil treatment plots giving 10·62 cwt. and 11·33 cwt. in the respective years. In Experiment XX, where the effect of time of pruning of single stem is being investigated, and where the early pruned plots have a mean yield of 11·55 cwt. over a four-year period, the

yield in the 1952 season was 6·88 cwt. per acre. In Experiment XVIII, where the progeny of seventy-one selections are on trial, the average yield per acre, over the seventeen acres, was 5·87 cwt., this followed an average yield of 9·87 cwt. in the 1951 season. In Square VIII of this experiment the progeny plots of H. 66 yielded at the rate of 13·98 cwt. per acre, the next highest yielder in this square gave 5·75 cwt. In the three previous seasons, the H. 66 progeny plots yielded at the rate of 16·83 cwt., 18·18 cwt. and 14·55 cwt. per acre respectively.

These figures show that the weather conditions in the period determining the 1952 crop were not the limiting factor to yields at quite high levels and, when considered with the complete records of Experiments V, XV, and XX, and of the progeny plots of some of the selections, they show that by choice of planting material and treatments, the weather factor, within the limits of that experienced at this Station, need not be the limiting factor to production at a reasonably high level.

Of the coffee sent to the mills 18·39 per cent and 56·42 per cent was classified as three and four respectively, the classification was probably lowered by the fact that almost ten per cent of the total crop was sold as seed. The out-turn figure, debes of cherry per ton of parchment, was four hundred.

Three thousand, nine hundred and thirty-one lb. of seed was sold to growers.

In order to be certain of obtaining accurate records of yields it has been necessary to sample each picking and take each sample through from cherry to clean coffee, i.e. obtain the out-turn figure for each sample. Analysis of the figures so obtained showed that, in respect of those experiments in which soil treatments were applied (mulch, irrigation or Sulphate of Ammonia), no accuracy would be lost if a composite sample from all plots at each picking was taken, in other words, the treatments had no effect on the out-turn figure. The variation in the out-turn figure for the progeny plots of the selections in any one square of Experiment XVIII does not allow of a composite sample being taken, but analysis has shown that it is possible to reduce the sampling to every other picking. The variation in the out-turn between selections may be seasonal only and may even itself out when the out-turn figures over a period of years are analysed. Should this be found to be so then the possibility of using composite samples from each season can be considered.

Experiments in the 1952 season indicated that it might be necessary only to take each sample to the wet parchment stage and use a factor to convert it to clean coffee. This will be investigated further in the 1953 season.

Analysis of the individual tree records of the seedling and clonal progeny of the nine parents in Experiment IIIA by the Statistical Department of the Rothamsted Experimental Station has shown that, to determine the degree of variation between progenies, and within progenies, single tree plots of seedlings are adequate, provided a clone of known range of yield is used as "key" plots.

On the basis of these findings it is now possible to test thirty progenies in an area of a little over an acre. Previously nine or twelve tree plots of clonal

material had to be used, and it was possible to test only six progenies in a corresponding area. The work of individual tree recording in past years may now be considered as having been adequately rewarded.

Although the yields from Experiment I and the Kents Plot cannot be considered as strictly comparable, they are, nevertheless, of interest as giving an indication of the yields of shaded and unshaded coffee under the Station conditions. These two plots of coffee are adjacent to one another. The Kents plot is shaded and is on a fairly steep slope with an eastern aspect; Experiment I, which is also planted with seedlings of Kents, is unshaded and is on more or less flat land. Experiment I contains plots of deep-planted coffee which, over a period of ten years, yielded at a mean annual rate of one cwt. per acre less than the remaining plots in the experiment. The annual yields for each area for fifteen years are given on pages 27 and 28. The variation in yield from year to year in the unshaded Experiment I is over a much wider range, 23·74 cwt. per acre down to nil; the corresponding figures for the Kents plot are 13·06 cwt. down to 1·90 cwt. The mean yields over a period of fifteen years for the two areas, however, differ by less than one cwt. per acre, being 7·49 cwt. for the shaded, and 8·24 cwt. for the unshaded area. The unshaded area certainly appears less thrifty at the present time and it will not yield well until the 1954/55 season at least.

The acute labour shortage limited the extent of further clearing that could be done on Lyamungu Coffee Estate. The areas cleared during the previous season were grassed down.

A Ransome M.G. 5 tractor was purchased during the year and was used, with its discs, for cultivation in the coffee areas suitable for mechanical cultivation. The work of discing was done reasonably satisfactorily, provided conditions allowed of cultivating at the time when the weed growth was not too heavy. In heavy weed the discs tended to ride. In very light weed the tendency was for the discs to penetrate the soil too deeply. The M.G. 5 tractor is really underpowered at this altitude; unless a wide turn is possible, it is found necessary to straighten the discs before turning.

In Central America experiments have been carried out with a view to replacing the normal fermentation process by the use of caustic soda or speeding up the process by the use of pectic enzymes. Considerable advantage is claimed by the use of these methods, the opinion is that not only is the crop dealt with more expeditiously, but a greater weight (two to three per cent) of bean is obtained from a given weight of wet parchment. Provided a sufficiently high concentration of either caustic soda or the pectic enzyme is used, the removal of the mucilage can be completed in as little as one hour, but the cost is high if the process is completed in so short a time.

Preliminary experiments were carried out with these substances at the end of the 1952 season. At low concentrations (costing between ten and twenty shillings per ton), it was found that the mucilage could be removed in twelve to sixteen hours. There was no ill effect on liquoring at these concentrations but it must be noted that the experiments were carried out on end of season crop, the liquoring standard of which is never high.

In my opinion, caustic soda must be ruled out on the grounds of the difficulties of handling.

Although correct fermentation has been shown to have no effect on liquoring quality, over-fermentation is considered detrimental. Over-fermentation often occurs as a result of the picking of mixed cherries, some over-ripe and some under-ripe, the beans from the over-ripe cherry often have started to ferment in the cherry and are therefore ready for washing far in advance of the beans from the under-ripe cherry, consequently, in these circumstances, over-fermentation of some beans, those from over-ripe cherry, always occurs. The use of pectic enzymes will not overcome this completely but, by using a concentration that will speed up fermentation to twelve to sixteen hours, it will lessen the extent of over-fermentation. The use of pectic enzymes has considerable possibilities with the African crop where, in many cases, over-fermentation is a serious problem.

Further experiments will be carried out in the 1953 season.

Improvement of Planting Material

The yield records of most of the clonal progeny plots of the selections (Experiment XVIII) were not improved by last season's crop, even so, there are quite a number which have not fallen below a mean annual yield of ten cwt. of clean coffee per acre over a period of six years or more. In Square III of Experiment XVIII N. 5, KP. 154, and KP. 423 achieve this, that for KP. 423 over the six bearing years being 13·67 cwt. per acre.

H. 66 (Square VIII) with a mean yield of 12·20 cwt. over eight years, is twenty-five per cent better than any of the others in this Square, N. 205 (Square IX), although only yielding at the rate of 5·90 cwt. in 1952, still has a mean annual yield over seven years of 10·53 cwt. KP. 532 (Square X) yielded at the rate of 12·42 cwt. in 1952 after giving not less than 14·84 cwt. per acre in the previous three years, its mean yield for seven years is 12·78 cwt.

After the very heavy crops borne in 1951 by the Seedling Progeny Plots (Experiment II) only those of N. 39 (Square II), H. 1 (Square III) and F. 840 (Square III) reached a yield of five cwt. or more in 1952. The progeny plots of H. 61 gave 3·30 cwt. in 1952 after 31·75 cwt. in 1951, its mean yield for the 1952 and the five previous seasons is 13·68 cwt., however.

The recording of the yields of the mother trees in the Kents plot and Experiment I were continued. No less than thirty-three of these have a mean yield at the rate of ten cwt. per acre, or more, for the fifteen-year period; the highest is 16·42 cwt.

The yields in 1952 in the experiments in which clones and seedlings are being compared (III and IIIA) made no difference to the findings at the end of last season. In Experiment III the seedlings again outyielded clones and the mean for the five-year period shows that seedlings have given a significantly higher yield. In Experiment IIIA there is no significant difference in mean yield between the clones and seedlings over a period of eight years.

Liquoring

Samples from the clonal progeny plots of the selections have been submitted for liquoring over a varying number of seasons. All, with the exception of three, have reached class 2 or higher in one or more seasons. The three exceptions attained a class 3. Of the selections which have been mentioned earlier in the report as having a mean annual yield of over ten cwt. per acre, N. 5, KP. 423 and N. 205 have attained a class 1, KP. 154, KP. 532 and H. 66 a class 2. High yield in any one year does not necessarily have an adverse effect on classification, in the seasons in which N. 5, KP. 423 and N. 205 each attained class 1, each yielded more than ten cwt. per acre, KP. 154 reached its highest classification in the season in which it yielded at the rate of twenty-six cwt. per acre.

Improvement of Growing Conditions

Experiment V was continued for another year and confirmed the findings of previous years, namely that, compost at the rate of one debe per tree has been an effective treatment over a period of twelve years. The mulch treatment (elephant grass) is almost significant over the same period, Sulphate of Ammonia when applied alone has increased yields but not significantly.

Although in Experiment XIII the trees pruned on the single stem system outyielded those on the multiple stem system, the mean annual yield over the fifteen-year period is still in favour of multiple stem pruning by thirty per cent.

In Experiment XX where the effect of time of pruning of single stem coffee is being investigated, the effect of early pruning over the four-year period is very marked, the yields resulting from pruning one month after harvest being significantly higher than those from plots pruned five and six months later. Observation suggests that pruning immediately after crop, and this time coincides with the normal flowering period, induces a greater degree of flowering. This is borne out by the fact that the early pruning treatment in Experiment XX was effective in the crop season immediately following its first application.

The effects of the various treatments of mulch and irrigation in Experiment XV having been recorded for a ten-year period, it was decided to modify some of the treatments. The plots receiving the most effective and economical treatments of mulch and irrigation, singly and in combination, have retained their particular treatments so that the Chemist may investigate their effects on soil conditions. The remaining plots will receive mulch and/or irrigation treatments at lower levels than previously. Although yields will be recorded, the area will become an observation plot and will provide information on which future experiments will be based.

In Experiment XIX in which coffee is being grown on the multiple stem system with, and without, farmyard manure, and with, and without, bananas, the whole area being under high Albizzia shade, the first year's results show that bananas have a depressing effect on yield and that farmyard manure, when applied to multiple stem coffee being grown without bananas, is beneficial. It must be emphasized that these results are for one year only.

Pests

Leaf miner (*Leucoptera spp.*) was very much in evidence during the last quarter of 1951, but its incidence decreased in the first quarter of 1952. It was again severe during the last quarter 1952—the normal time for high incidence.

Antestia lineaticollis showed an unprecedented increase in its incidence during May, normally this does not occur until September. The increase is considered to have been due to the unusually warm weather.

Thrips (*Physothrips xanthoceros*) appeared in three Squares of Experiment XVIII during August, but did not become serious and it was unnecessary to spray. An outbreak also occurred in the young coffee in Experiments IIIB, XVIIIA and XXI. It was noticeable that the selections within Kents in Experiment XVIIIA, F. 840 and KP. 262, were affected first, well before the other selections in these experiments. Position in the field is not likely to be a factor in this since the plots of these two selections are scattered throughout the experiment—greater susceptibility to thrips must be considered to be a characteristic of these two selections. This is the first recorded instance of varying degrees of susceptibility to thrips in the various strains of arabica, or, for that matter, to any pest.

Coffee Stem Borer (*Anthores leuconotus*), again showed an increase in incidence.

Mealy Bug (*Pseudococcus filamentosus*) was not in evidence during the year.

Mites (*Hemitarsonemus latus*) attacked the new growth during the last quarter of the year. The most severe outbreak was in Experiment V, and it was noticeable that the young growth on single stem trees was more severely affected than that of multiple stem trees.

Vermin.—Moles did considerable damage in the young coffee in Experiments XVIIIA, IIIB and XXI. Some six hundred were trapped in the area of seven acres occupied by these experiments.

Diseases

The incidence of Hemileia vastatrix was severe in Experiments I, III, X, XII and XVII in the early part of the year, i.e. January to March, 1952. The fungus had apparently already infected the leaves before Perenox was applied, it should be noted that the weather conditions in the last quarter of 1951 were favourable to the spread of the fungus, added to which the heavy crop in 1951 resulted in the reserves of the trees being reduced and this may have lessened any degree of resistance.

The incidence of the disease in July and August, 1952 was controlled by the post-monsoon spraying.

Mbosi Sub-Station

Investigational work was continued on the incidence and causes of "wither" or "black" tip and dieback in the coffee in the Mbosi District.

The Agricultural Officer in charge of the Sub-Station has made the following observations on the incidence of wither tip and dieback at Mbosi:—

(1) Wither tip, which occurs at the time of flowering in October-November, is not necessarily followed by dieback.

(2) Dieback occurs at two periods:

(a) Just prior to the rains of September-October, at this period it is not marked by leaf fall, the primary or secondary dies with leaves attached. The affected branch dies quickly. This type of dieback may extend into the rains of January but no further incidence occurs after February;

(b) Immediately following the rains. In this type leaf fall occurs and the distal part of the primary or secondary dies. The dieback may extend progressively along the whole length of the primary. This type may also start in the middle of the primary and spread to the distal part. This condition may be due to leaf fall.

His observations on the effect of protection from wind and sun, or sun only, on coffee under field conditions, are that protection from wind and afternoon sun, or wind only, promotes lush growth during the rains but thereafter fails to stop dieback.

The plants grown under greenhouse conditions in Mbosi soil made quite normal growth, there has been no sign of distortion, yellowing, or short internodal growth as is found under field conditions. The observations indicate that, with adequate watering and protection from extremes of temperature, coffee of normal appearance can be grown in one Mbosi soil at any rate. The question arises, however, as to the precise part played by the water factor.

The Government Chemist continued the chemical investigation of the problem of "wither tip" and "dieback". The following are extracts from his report—

"Visual Symptoms.—Of the many visual symptoms of ill-health which may be seen amongst the poorer Mbosi coffee (e.g. leaf yellowing and distortion, "stringy" trees, etc.) two are of outstanding significance, namely, "*dieback*" and "*black tip*".

"*Black tip*", or the premature death of the meristematic tissue at the growing point of the new flush, is typical of the symptoms associated with calcium deficiency.

"*Dieback*" of the whole primary, which follows later in the growing season, could be ascribed to the deficiency of one or more of a number of elements including calcium. If, in fact, dieback is caused by mineral deficiency, visual symptoms alone will not be sufficient to disclose which one is deficient.

An important line of future investigation will be to discover whether black tip is necessarily followed by dieback on the same primary.

Leaf Analysis

From February, 1951 to March, 1952 samples of leaves were taken monthly from two areas at Mbosi and compared analytically with samples taken from mature healthy coffee trees grown at Lyamungu.

The results of these monthly analyses show:—

1. That the *calcium* content of Mbosi coffee leaves is consistently and significantly lower than the calcium content of Lyamungu leaves throughout the year, except for a limited period of calcium build up at Mbosi during November and December;

2. That the *manganese* content of Mbosi coffee leaves is significantly higher (about three times higher) than the manganese content of Lyamungu grown leaves during the period June to October (i.e. the Mbosi dry season);

3. That despite considerable fluctuations in the boron content, the Mbosi leaves, on the whole, contain distinctly less *boron* than the Lyamungu leaves;

4. That with all the other elements essential to plant growth there is no appreciable difference between the levels at Mbosi and Lyamungu (*zinc* and *molybdenum* were not done during the monthly chemical analyses, but injection and spraying of these elements on affected trees at Mbosi brought no response).

Soil Analysis

Soils from the same two areas at Mbosi and from the coffee shambas at Lyamungu have been analysed and comparison of the results shows that Mbosi soils are particularly low in readily available *calcium*, and have roughly ten times the amount of available *manganese* found in the Lyamungu soils. No boron analyses were done since the availability of soil boron is not fully understood.

It was considered that the results quoted above under the three headings afford strong evidence that the coffee at Mbosi is suffering from a nutritional disorder. All the results from the three different approaches are consistent one with another and point to a manganese induced calcium deficiency in which boron may also be involved. It is interesting to note that research work in the United Kingdom has shown that calcium uptake by a plant can be reduced by excess manganese.

It now remains to be shown whether this nutritional disorder is directly responsible for black tip, dieback, or both, and to this end calcium sulphate soil applications and calcium and boron injections were carried out.

Calcium sulphate applications to a few badly affected trees resulted in no improvement. These applications were made in November and I think they were made far too late in the year to have any effect.

Calcium and boron injections were made late in the 1951/52 growing season. Some response was obtained with the new growth but interpretation of the results was inconclusive due to the difficulties inherent in the injection technique and because some of the experiments were disturbed by estate labourers.

It was therefore decided to lay down a very small scale trial in August, 1952 on some poor coffee at Mbosi with a view to "catching" the dieback well in advance. This trial consisted of applying calcium sulphate, calcium borate, bat guano and combinations of all three. Monthly analyses of the leaves of the treated trees are being compared with untreated trees and the Agricultural Officer at Mbosi has been asked to report on whether the treated trees show improved and healthy growth when the rest of the shamba suffers from its annual incidence of dieback (if, of course, there is any dieback this year).

It will be appreciated that this experiment is not yet completed but the following tentative conclusions may be stated in the nature of an interim report:—

1. Some of the treatments have been very effective in reducing the high manganese levels in the leaves. In fact, in some cases the manganese levels are down to those of Lyamungu in September/October, but later analyses showed that the manganese content of the treated leaves began building up again.

2. Calcium levels have not yet been appreciably raised.

3. Boron figures fluctuate too much for any conclusions to be drawn from such a small scale trial.

4. It has also become obvious that our first doses of chemicals were insufficient. Further doses are now being sent to the Agricultural Officer so that the experiment may be continued throughout the dieback season.

The field experiments with phosphatic manures, and the selection trials, have been maintained. The first crop from these is expected in the 1952/53 season.

Cattle

The Zebu herd now consists of one stud bull, forty-one bullocks and bull calves, and eighty-six cows, heifers and heifer calves.

Thirty-seven cows and heifers were in milk during the year and the production amounted to 7,336 gallons—an average of 198 gallons.

The progeny of the bull Sahibo are well ahead of the progeny of any of the previous bulls. One of his daughters, Akatha, produced 26·4 lb. in one day. Sitimu produced 419·1 gallons in 302 days, this was in her ninth lactation. Two other cows exceeded 300 gallons and fourteen more the 200-gallon mark.

There were nine cases of "fly" during the year, three cases proved fatal. The incidence of "fly" was greatest in April and May, usually the cases occur in the period January to March.

The demand for bull calves out of the higher yielding cows is negligible, only one was sold during the year.

Fruit

The deciduous fruit trees were again sprayed with a proprietary D.N.O.C. winter wash to break the prolonged dormancy to which such trees are prone at this altitude, where winter temperatures are comparatively high. The success of this treatment on the plums and apples was demonstrated. Over forty lb. of fruit was harvested from one tree of Methley plum, which had been planted in the orchard in 1948.

Visitors

Visitors to the Station during the year included the High Commissioner for Madagascar, the Honourable the Director of Agriculture, Dr. Wellman (Costa Rica), Dr. Cowgill (Guatemala), Dr. Sylvain (F.A.O., Addis Ababa), Dr. Simmonds (Commonwealth Institute of Biological Control, Trinidad), and Dr. Meiklejohn (E.A.A.F.R.O., Muguga).

Several parties of students, and members of African Co-operative Societies, were shown round the Station.

Coffee Research Station,
Lyamungu, Moshi,
September, 1953

F. R. Sanders,
Senior Research Officer

DETAILS AND RECORDS OF EXPERIMENTS

All yields are expressed as cwts. of clean coffee per acre.

Unless otherwise stated, an out-turn figure of sixteen per cent has been used when converting weights of cherry to their equivalent in clean coffee.

A difference between any two treatments greater than the figure given as "Significant difference" can be considered as being due to the particular treatment. Unless otherwise stated, the figure for significant difference is at the level of probability of P=0·05, at this level of probability the chances against drawing the wrong conclusion by using the significant difference figure is nineteen to one.

EXPERIMENT XVIII—CLONAL SELECTION TRIALS

These trials consist of a series of 6 x 6 Latin squares, wherein the yields of rooted cuttings of potential selections are compared. Planting commenced in April, 1943; additional squares have been planted up subsequently, as material became available. By the end of 1951 sixteen squares had been planted, of which fourteen were in bearing. All squares planted prior to April 1944 (eight in number) have been pruned on the single stem system; those planted subsequently have been grown on multiple stem. Each square is planted with the following shade tree, so that each of the six plots of any one clone has a different semi-permanent shade tree.

Semi-permanent:—

Albizzia moluccana
Albizzia stipulata
Albizzia sp. ("Tangasale")
Cordia holstii
Ficus sycamorus
Maesopsis eminii

Permanent:—

Albizzia Maranguensis

Yearly yields and mean yields for each square are given below, the calculated yields of the original parents being included for reference.

EXPERIMENT XVIII—LATIN SQUARE I.—PLANTED 29.4.43—SINGLE STEM

PARENT												
Mean Yield	No. of years re-corded	Clone	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 8 years 1945-52	
											Cwts.	Per-cent-ages
16·83 ...	7	N 39	4·84	1·30	*13·61	2·46	11·49	15·53	16·35	2·93	8·56	98
10·17 ...	7	R 23	1·29	1·44	12·32	0·52	16·94	10·40	17·68	2·11	7·83	90
13·59 ...	7	N 71	1·37	2·18	12·09	1·12	16·36	12·73	17·41	1·39	8·06	92
32·48 ...	1	I 60	2·04	3·52	14·98	1·10	16·45	18·51	15·29	4·91	9·71	111
6·69 ...	4	M 2	1·90	3·37	12·07	1·97	15·02	15·42	18·30	2·04	8·76	100
11·44 ...	8	L 1	2·33	2·04	14·45	1·23	18·12	16·33	18·56	3·74	9·60	110
Mean			2·29	2·31	13·25	1·40	15·73	14·82	17·24	2·85	8·75	100
Standard Error			0·26	0·45	–	0·32	0·82	1·59	1·37	0·45	0·20	2
Significant Difference (P = ·05) ...			0·76	1·32	–	0·94	2·42	4·70	–	1·33	0·60	7

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE II.—PLANTED 30.4.43—SINGLE STEM

PARENT										Mean of 8 years 1945-52	
Mean Yield	No. of years recorded	Clone	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Cwts.	Percentages
17·12 ...	7	N 20	1·44	2·22	10·54	1·25	13·25	14·85	13·88	2·47	7·49	91
12·54 ...	7	N 30	2·98	0·95	10·54	0·86	12·61	11·84	17·94	2·15	7·49	91
14·39 ...	7	N 29	3·03	2·43	12·31	1·59	13·71	12·93	18·47	2·34	8·35	101
14·55 ...	7	N 5	5·29	0·93	*12·92	1·06	10·92	12·76	20·95	3·18	8·50	103
32·04 ...	1	N 48	2·06	2·43	10·81	0·73	15·20	16·04	14·14	2·17	7·96	96
13·88 ...	7	N 197	4·17	5·33	*14·07	1·60	15·92	18·58	15·20	3·98	9·85	119
Mean			3·17	2·39	11·87	1·18	13·60	14·50	16·79	2·71	8·27	100
Standard Error			0·33	0·46	–	0·18	0·81	1·43	1·28	0·44	0·27	3
Significant Difference (P = ·05) ...			1·39	1·35	–	0·53	2·38	4·22	3·78	1·30	0·78	9

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE III.—PLANTED 26.10.44—MULTIPLE STEM

PARENT									Mean of 6 years 1947-52	
Mean Yield	No. of years recorded	Clone	1947	*1948	*1949	*1950	*1951	*1952	Cwts.	Percentages
14·55	7	N 5	*6·26	11·42	14·39	11·88	10·87	6·81	10·27	100
13·77	6	AB 35	4·56	11·60	11·63	13·79	11·84	5·45	9·82	96
11·49	12	KP 154	3·25	13·40	15·33	19·98	9·55	7·64	11·52	112
14·78	12	KP 423	6·82	13·48	14·11	26·18	12·55	8·90	13·67	133
5·04	4	M 97	5·51	10·51	10·99	9·29	8·66	5·29	8·37	82
12·13	7	N 106	5·79	8·10	10·24	10·12	7·51	5·45	7·88	77
Mean			5·37	11·42	12·78	15·20	10·16	6·59	10·25	100
Standard Error			–	0·62	0·93	1·36	1·15	0·63	0·32	3
Significant Difference (P = ·05)			–	1·84	2·73	4·01	3·39	1·85	0·94	9

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE V.—PLANTED 14.4.49—MULTIPLE STEM

PARENT Mean Yield	No. of years recorded	Clone	*1951	*1952	Mean of 2 years, 1951-1952	
					Cwts.	Percentages
11·44	8	L 1	3·57	7·80	5·68	96
16·19	5	X 208	3·13	9·02	6·08	103
12·32	5	U 329	3·19	8·29	5·75	97
13·66	5	Q 89	3·14	8·59	5·87	99
16·60	5	X 216	3·57	9·28	6·42	109
8·89	10	AB 37	2·81	8·34	5·57	94
Mean			3·24	8·55	5·90	100
Standard Error			0·44	0·64	0·50	8
Significant Difference			–	–	–	–

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE VI.—PLANTED 15.4.49—MULTIPLE STEM

PARENT Mean Yield	No. of years recorded	Clone	*1951	*1952	Mean of 2 years, 1951-1952	
					Cwts.	Percentages
16·83	7	N 39	4·16	8·77	6·47	124
14·23	7	N 219	2·73	7·50	5·12	98
15·19	5	X 125	2·46	7·83	5·15	99
11·85	14	KP 146	2·64	7·78	5·22	100
16·34	5	X 297	3·06	9·02	6·05	116
12·13	7	I 89	1·64	5·14	3·40	65
Mean			2·78	7·67	5·23	100
Standard Error			0·55	0·87	0·67	13
Significant Difference			–	–	–	–

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE VII.—PLANTED 7.6.43—SINGLE STEM

PARENT											Mean of 8 years 1945-52	
Mean Yield	No. of years re-corded	Clone	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Cwts.	Per-cent-ages
13·87 ...	7	R 15	3·63	2·50	*13·13	0·94	17·81	15·86	16·54	2·46	9·10	106
11·23 ...	7	N 81	3·76	3·65	15·43	2·92	16·39	14·04	16·89	3·06	9·52	111
9·60 ...	12	KP 228	2·80	2·80	14·62	5·79	14·37	18·06	18·54	5·48	10·31	120
10·45 ...	7	I 49	2·14	1·43	10·78	1·24	14·75	18·76	10·17	3·92	7·91	92
3·75 ...	3	S 16	2·32	0·95	10·43	1·18	11·33	12·09	11·20	1·46	6·36	74
15·19 ...	7	N 34	1·68	1·90	10·57	1·28	17·57	17·07	12·33	2·84	8·16	95
Mean			2·73	2·21	12·49	2·23	15·37	15·99	14·28	3·20	8·56	100
Standard Error			0·44	0·38	–	0·42	0·78	1·61	0·83	0·47	0·34	4
Significant Difference ... (P = ·05)			1·30	1·12	–	1·25	2·30	–	2·45	1·38	0·99	12

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE VIII.—PLANTED 13.8.43—SINGLE STEM

PARENT											Mean of 8 years 1945-52	
Mean Yield	No. of years re-corded	Clone	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Cwts.	Per-cent-ages
14·02 ...	7	R 2	2·38	4·55	13·75	1·28	19·36	9·71	17·23	3.74	9·00	94
11·27 ...	4	H 66	2·58	3·47	*20·28	7·72	14·55	18·18	16·83	13·98	12·20	127
6·14 ...	4	M 7	1·46	3·48	11·24	1·96	17·22	12·32	13·83	5·38	8·36	87
11·95 ...	6	AB 92	0·95	3·20	11·43	2·36	16·16	15·32	13·68	5·63	8·59	90
15·04 ...	7	N 218	2·23	2·25	14·62	3·26	16·67	13·57	17·32	5·75	9·46	99
13·58 ...	7	N 100	2·22	4·65	*14·30	1·77	20·09	13·69	17·98	4·65	9·92	103
Mean			1·97	3·59	14·27	3·06	17·34	13·79	16·15	6·52	9·59	100
Standard Error			0·35	0·47	–	0·68	1·20	1·20	1·26	0·74	0·26	3
Significant Difference ... (P = ·05)			1·02	1·38	–	2·00	3·54	3·54	–	2·19	0·76	8

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE IX.—PLANTED 20.12.43—SINGLE STEM

PARENT											
Mean Yield	No. of years recorded	Clone	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 7 years 1946-52	
										Cwts.	Per-cent-ages
10·49 ...	6	AC 98	4·07	9·54	4·24	14·07	11·42	10·88	6·39	8·66	95
18·38 ...	7	R 3	5·22	10·12	1·70	18·43	6·54	14·81	3·50	8·62	94
10·62 ...	12	KP 683	4·46	13·63	4·78	14·54	8·33	12·09	6·83	9·25	101
14·07 ...	7	N 205	6·60	13·02	3·10	18·30	10·73	16·03	5·90	10·53	115
10·94 ...	7	N 128	4·87	12·91	1·75	17·37	5·02	16·37	3·77	8·87	97
11·29 ...	7	I 5	4·58	10·39	2·87	17·52	7·83	15·57	3·98	8·96	98
Mean			4·96	11·60	3·07	16·71	8·31	14·29	5·06	9·15	100
Standard Error			–	–	0·51	1·36	1·26	0·86	0·63	0·35	4
Significant Difference (P = ·05)			–	–	1·40	–	3·72	2·53	1·85	1·04	11

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE X.—PLANTED 29.12.43—SINGLE STEM

PARENT										
Mean Yield	No. of years recorded	Clone	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 7 years 1946–52	
										Cwts.	Per-cent-ages
36·90 ...	1	N 110	4·79	12·99	3·02	11·45	11·03	10·48	10·98	9·25	91
7·37 ...	3	M 95	4·13	11·16	0·93	13·22	13·25	7·58	6·09	8·05	79
11·28 ...	12	KP 532	5·36	16·03	8·32	14·84	15·50	17·01	12·42	12·78	126
13·88 ...	7	N 197	9·50	*13·70	3·13	17·31	16·02	10·79	10·73	11·60	115
11·98 ...	7	I 235	5·15	12·05	2·38	15·73	15·55	12·08	5·95	9·84	97
11·71 ...	7	R 11	5·18	11·14	1·62	16·45	11·97	12·24	6·29	9·27	92
Mean			5·69	12·85	3·24	14·83	13·89	11·69	8·74	10·13	100
Standard Error			–	–	0·64	0·85	1·63	1·10	1·09	0·38	4
Significant Difference (P = ·05)			–	–	1·90	2·50	–	3·24	3·21	1·12	11

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XI.—PLANTED 16.4.46—MULTIPLE STEM

PARENT				*1948	*1949	*1950	*1951	*1952	Mean of 5 years 1948-52	
Mean Yield	No. of years recorded	Clone							Cwts.	Per-cent-ages
9·22	11	KI	363	3·01	16·34	13·92	15·10	4·87	10·65	120
13·88	7	N	197	1·18	10·91	14·93	6·05	4·53	7·52	84
13·58	7	N	100	1·80	12·88	17·65	8·20	4·68	9·04	101
18·38	7	R	3	1·20	10·68	12·21	6·81	4·73	7·12	80
14·55	7	N	5	1·67	18·14	12·99	10·23	7·33	10·07	113
16·83	7	N	39	1·08	14·56	12·53	12·43	4·54	9·02	101
Mean				1·66	13·91	14·04	9·80	5·12	8·91	100
Standard Error				0·21	0·91	1·18	0·89	0·76	0·34	4
Significant Difference (P = ·05)				0·61	2·69	3·48	2·63	–	0·99	11

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XII.—PLANTED 16.4.46—MULTIPLE STEM

PARENT				*1948	*1949	*1950	*1951	*1952	Mean of 5 years 1948-52	
Mean Yield	No. of years recorded	Clone							Cwts.	Per-cent-ages
10·81	12	KP	227	3·16	17·89	18·65	11·00	6·05	11·35	115
11·81	7	N	181	3·50	17·94	11·20	7·69	7·45	9·55	97
13·58	7	N	100	3·29	13·93	16·20	6·14	4·37	8·79	89
10·03	7	R	24	1·76	11·99	16·40	5·08	5·82	8·21	83
13·11	12	KP	231	0·89	12·41	19·24	8·97	4·50	9·20	108
12·55	12	KP	163	3·32	18·53	17·77	8·42	5·39	10·69	108
Mean				2·65	15·45	16·57	7·88	5·60	9·63	100
Standard Error				0·55	1·15	1·15	0·81	0·63	0·75	8
Significant Difference (P=·05)				1·62	3·39	3·38	2·40	1·85	–	–

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XIII.—PLANTED 26.4.46—MULTIPLE STEM

PARENT								
Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950	*1951	*1952
11·27	5	X 321	2·71	13·69	17·86	12·63	8·57
10·76	6	AC 189	3·49	7·71	13·12	6·97	4·56
13·58	7	N 100	0·79	8·60	19·21	6·32	4·45
13·87	7	R 15	–	–	9·86	8·88	6·55
6·74	12	KP 162	–	–	10·40	12·15	7·82
10·49	6	AC 98	–	–	11·56	9·71	5·59

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XIV.—PLANTED 21.5.47—MULTIPLE STEM

PARENT								
Mean Yield	No. of years recorded	Clone	*1949	*1950	*1951	*1952	Mean of 4 years 1949-52	
							Cwts.	Per-cent-ages
18·38	7	R 3	0·38	6·56	10·38	5·15	5·62	82
15·20	7	N 50	0·57	6·44	7·40	4·76	4·79	70
15·87	4	H 1	0·49	5·92	14·73	8·54	7·42	108
10·59	6	AC 53	0·42	8·52	11·96	5·55	6·62	96
36·90	1	N 110	0·58	8·59	15·29	6·00	7·62	111
Unknown	–	KIL 10	0·46	6·31	19·45	10·28	9·12	133
Mean			0·49	7·06	13·20	6·72	6·87	100
Standard Error			0·13	0·92	1·15	0·85	0·53	8
Significant Difference (P=·05)			–	–	3·39	2·50	1·56	23

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XV.—PLANTED 26.1.44—SINGLE STEM

PARENT											
Mean Yield	No. of years recorded	Clone	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean o 7 years 1946-52	
										Cwts.	Per-cent-ages
11·95 ...	6	AB 11	1·63	12·63	2·61	11·99	9·55	5·56	7·81	7·42	99
15·20 ...	7	N 50	0·82	9·82	1·72	13·88	7·34	6·55	9·93	7·15	95
11·44 ...	8	L 1	1·17	13·66	2·74	13·52	6·69	8·09	11·80	8·24	110
9·32 ...	12	KP 263	1·54	9·62	6·38	8·29	11·60	4·43	16·86	8·41	112
11·83 ...	7	I 47	1·23	10·73	2·23	12·31	5·88	7·82	7·90	6·87	92
14·08 ...	7	N 215	1·95	9·97	1·79	11·91	5·81	8·56	7·85	6·83	91
Mean			1·39	11·07	2·91	11·99	7·81	6·83	10·36	7·49	100
Standard Error			–	–	0·61	1·00	1·00	0·75	1·17	0·34	5
Significant Difference (P=·05)			–	–	1·79	2·94	2·96	2·22	3·44	0·99	13

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XVI—PLANTED 3.3.44—SINGLE STEM

PARENT											
Mean Yield	No. of years recorded	Clone	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 7 years 1946-52	
										Cwts.	Per-cent-ages
11·27 ...	7	N 198	0·72	7·93	2·67	13·30	11·44	11·66	6·07	7·68	96
18·38 ...	7	R 3	0·66	7·88	0·87	13·23	10·90	11·89	7·22	7·52	94
8·38 ...	7	R 25	0·66	7·04	2·01	11·49	9·96	12·59	5·92	7·11	89
12·63 ...	7	N 76	0·83	8·85	3·89	13·77	14·09	10·74	7·82	8·56	107
13·31 ...	7	N 220	0·86	4·85	2·87	10·52	9·88	11·04	5·39	6·49	81
13·88 ...	7	N 197	1·33	*9·29	5·34	17·66	19·68	13·76	8·09	10·73	134
Mean			0·85	7·64	2·94	13·23	12·66	11·95	6·75	8·02	100
Standard Error			–	–	0·60	0·70	0·87	0·54	0·74	0·26	3
Significant Difference (P=·05)			–	–	1·78	2·08	2·57	1·59	2·19	0·76	9

*Using actual out-turn.

EXPERIMENT XVIII—LATIN SQUARE XVII.—PLANTED 13.9.45—MULTIPLE STEM

PARENT Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950	*1951	*1952	Mean of 5 years 1948-52	
								Cwts.	Per-centages
6·74	12	KP 162	6·76	17·91	24·94	12·45	6·62	13·74	141
15·19	7	N 34	7·20	15·79	19·37	7·73	6·39	11·30	116
14·71	7	N 14	1·90	8·89	11·44	7·65	6·59	7·29	75
12·66	7	I 56	4.84	11·81	15·35	6·40	8·52	9·39	96
18·38	7	R 3	4·99	11·86	12·89	6·21	6·37	8·47	87
7·13	7	F 502	6·05	9·94	16·54	6·35	3·46	8·47	87
Mean			5·29	12·70	16·75	7·80	6·33	9·78	100
Standard Error			0·91	1·05	1·09	1·03	0·70	0·54	6
Significant Difference (P=·05)			2·67	3·10	3·33	3·02	2·06	1·59	17

*Using actual out-turn.

EXPERIMENT IV—SQUARES II, V AND IX—CLONAL SELECTION TRIALS

The three original squares in Experiment IV were uprooted, because of the unsuitability of the various exotic coffee planted therein. As material became available, they were each replanted with the same five clones, Squares II and V being grown on the single stem system and Square IX on multiple stem. The spacing is 8 ft. x 8 ft. apart.

The results have been disappointing, probably due to the heavy shade, prior to 1948, of *Acrocarpus fraxinifolius*, *Cordia holstii*, and *Albizzia maranguensis*, and the previous existence of coffee in the area, the yields in 1949, 1950 and 1951 have however, shown considerable improvement.

EXPERIMENT IV—LATIN SQUARE II.—PLANTED 13.4.43—SINGLE STEM

PARENT Mean Yield	No. of years recorded	Clone	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 8 years 1945-52	
											Cwts.	Per-centages
16·83	7	N 39	1·11	Crop Failed	4·84	2·34	5·63	16·41	11·44	0·39	5·19	93
18·38	7	R 3	1·31		6·56	0·38	9·70	10·13	10·94	0·44	4·82	87
11·44	8	L 1	1·40		8·21	1·51	12·52	14·78	12·61	0·73	6·33	114
13·58	7	N 100	1·19		7·64	1·01	9·90	12·88	12·19	0·46	5·52	99
13·88	7	N 197	1·64		8·08	1·48	10·23	15·60	11·35	0·72	5·99	107
Mean			1·33		7·07	1·34	9·60	13·96	11·69	0·55	5·57	100
Standard Error			0·15		–	0·351	0·64	0·94	0·87	0·11	0·16	3
Significant Difference			0·45		–	1·083	1·98	2·90	–	–	0·49	9

*Using actual out-turn.

EXPERIMENT IV—LATIN SQUARE V.—PLANTED 9.4.42—SINGLE STEM

PARENT Mean Yield	No. of years recorded	Clone	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 8 years 1945-52 Cwts.	Mean of 8 years 1945-52 Percentages
16·83 ...	7	N 39	2·47	Crop Failed	3·28	5·76	4·82	21·76	9·68	0·60	5·99	93
18·38 ...	7	R 3	4·37		8·52	0·88	10·30	12·45	11·77	0·41	5·94	92
11·44 ...	8	L 1	3·86		9·58	1·51	11·12	16·78	11·85	0·96	6·80	105
13·58 ...	7	N 100	2·97		9·74	0·93	11·66	14·98	11·60	0·52	6·38	99
13·88 ...	7	N 197	4·23		10·09	2·65	11·27	18·84	10·35	1·17	7·15	111
Mean			3·58		8·24	2·35	9·83	16·97	11·02	0·73	6·45	100
Standard Error			0·33		–	0·459	0·94	1·21	0·80	0·08	0·28	4
Significant Difference (P=·05) ...			1·02		–	1·415	2·91	3·72	–	0·25	0·85	13

*Using actual out-turn.

EXPERIMENT IV.—LATIN SQUARE IX.—PLANTED 17.3.44—MULTIPLE STEM

PARENT Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950	*1951	*1952	Mean of 5 years 1948-52 Cwts.	Mean of 5 years 1948-52 Percentages
16·83	7	N 39	2·19	11·30	4·05	12·61	2·61	6·55	107
18·38	7	R 3	2·34	7·18	6·22	10·10	1·95	5·55	91
11·44	8	L 1	1·94	7·09	7·71	8·35	3·71	5·76	94
13·58	7	N 100	2·61	9·30	7·03	8·60	2·10	5·92	97
13·88	7	N 197	2·86	10·08	7·78	9·35	3·82	6·77	111
Mean			2·39	8·99	6·55	9·77	2·84	6·11	100
Standard Error			0·440	1·06	0·65	1·15	0·33	0·37	6
Significant Difference (P=·05)			–	–	1·99	–	1·00	1·13	18

*Using actual out-turn.

EXPERIMENT II—SEEDLING SELECTION TRIALS

These trials are laid out in the form of four 6 x 6 latin squares, and two randomized blocks, each with nine selections repeated six times. The object of the experiment is to compare the yields of seedling progeny of potential selections under the conditions existing at this Station. The area has high light shade of *Albizzia maranguensis*, *Cordia Holstii*, and *Leucaena glauca*.

The yearly yields, and means over the bearing period, are given below and are expressed as cwts. of clean coffee per acre. The calculated yields of the parent trees, from which the original seed was obtained, are also given as a matter of interest, together with the number of years for which each tree was recorded. No direct comparison between these latter is possible, however, except where they bear the same initial letter, since they originate from estates often in widely differing districts.

EXPERIMENT II.—LATIN SQUARE I.—PLANTED MAY, 1938—SINGLE STEM

SUMMARY OF RESULTS FOR 1941–52

Yields calculated as cwts. of clean coffee per acre

PARENT																
Mean Yield	No. of years recorded	Selection	1941	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 12 years 1941—1952	
															Cwts.	Percentages
7·13 ...	7	F 502	1·32	2·65	6·82	8·42	3·94	5·02	16·32	4·14	14·00	6·35	17·55	3·81	7·53	124
15·00 ...	5	P 280	1·21	4·35	7·01	7·87	2·55	4·85	13·84	1·80	12·15	5·48	14·57	2·03	6·47	106
11·88 ...	5	P 313	0·95	4·60	6·17	8·30	2·57	4·45	13·78	4·37	12·12	6·63	17·73	1·63	6·95	114
12·32 ...	5	P 348	0·84	2·07	4·43	6·38	1·19	5·31	9·75	4·63	9·42	5·05	14·90	3·40	5·61	92
13·17 ...	5	P 147	0·73	1·57	3·82	5·96	1·54	4·20	10·09	4·88	8·99	6·32	15·19	3·15	5·65	93
13·34 ...	5	P 190	0·77	1·29	1·53	3·69	0·87	3·63	6·56	6·78	6·22	5·87	11·70	2·78	4·31	71
Mean			0·97	2·76	4·96	6·77	2·10	4·58	11·72	4·43	10·50	5·95	15·27	2·80	6·08	100
Standard Error			–	0·29	0·33	0·42	0·38	0·51	0·73	0·70	1·06	0·60	1·07	0·37	0·24	4
Significant Difference			–	1·55 (P=·001)	0·96 (P=·05)	1·24 (P=·05)	1·12 (P=·05)	–	2·17 (P=·05)	2·06 (P=·05)	3·11 (P=·05)	–	3·16 (P=·05)	1·10 (P=·05)	0·70 (P=·05)	12

*Using actual out-turn.

EXPERIMENT II.—LATIN SQUARE II.—PLANTED OCTOBER, 1938—SINGLE STEM

SUMMARY OF RESULTS FOR 1942–52

Yields calculated as cwts. of clean coffee per acre

PARENT			1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 11 years 1942–52	
Mean Yield	No. of years recorded	Selection												Cwts.	Percentages
15·04 ...	4	H 133	1·56	4·67	4·57	1·45	3·18	13·37	1·98	12·11	9·07	20·16	2·27	6·75	100
11·44 ...	8	L 1	1·13	4·86	4·42	2·05	3·52	14·42	4·45	12·92	9·87	23·34	2·70	7·61	113
9·39 ...	7	F 839	1·11	4·78	5·39	3·91	2·38	15·38	3·70	13·03	8·00	22·81	4·51	7·73	115
16·83 ...	7	N 39	0·93	3·09	3·35	3·46	3·04	12·86	6·48	7·99	12·48	21·27	6·59	7·41	110
13·17 ...	5	P 147	0·76	2·78	4·28	0·88	3·29	10·17	5·02	9·21	7·21	16·18	3·88	5·78	86
7·50 ...	7	E 59	0·69	2·04	3·94	0·88	3·20	8·62	5·74	7·04	5·88	17·02	2·61	5·24	78
Mean			1·03	3·71	4·29	2·10	3·10	12·47	4·56	10·38	8·75	20·13	3·76	6·75	100
Standard Error			0·27	0·37	0·24	0·33	0·44	0·69	0·73	0·65	0·67	1·11	0·43	0·21	3
Significant Difference (P=·05)			–	1·08	0·70	0·99	–	2·02	2·22	1·91	1·98	3·26	1·26	0·62	9

*Using actual out-turn.

EXPERIMENT II.—LATIN SQUARE III.—PLANTED OCTOBER 1938—SINGLE STEM

SUMMARY OF RESULTS FOR 1942–52

Yields calculated as cwts. of clean coffee per acre

PARENT		Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 11 years 1942–52	
Mean Yield	No. of years recorded													Cwts.	Percentages
15·07 ...	4	H 1	1·34	4·85	8·36	3·64	1·82	15·78	7·55	14·67	11·10	26·32	6·19	9·24	123
8·75 ...	7	F 840	0·90	4·57	7·87	3·65	3·44	15·96	4·33	14·80	10·33	25·56	5·32	8·79	117
11·88 ...	5	P 313	3·13	4·13	5·87	0·75	2·29	11·24	1·26	14·83	6·42	22·23	0·72	6·64	88
13·75 ...	7	N 69	1·83	5·42	5·06	1·53	3·37	11·89	1·62	17·45	7·32	29·00	1·31	7·80	104
15·20 ...	7	N 50	1·54	4·77	4·55	1·08	2·61	10·81	1·45	15·55	6·25	23·68	1·11	6·64	88
6·57 ...	7	E 665	1·40	2·44	4·24	0·55	2·78	8·51	3·64	12·08	5·99	21·80	2·18	5·97	79
Mean			1·69	4·39	5·99	1·87	2·72	12·37	3·31	14·90	7·90	24·76	2·80	7·51	100
Standard Error			0·26	0·33	0·44	0·37	0·45	1·07	0·45	1·05	0·94	1·51	0·31	0·33	4
Significant Difference			1·39 (P=·001)	0·96 (P=·05)	1·30 (P=·05)	1·08 (P=·05)	– –	3·14 (P=·05)	1·34 (P=·05)	3·09 (P=·05)	2·78 (P=·05)	4·46 (P=·05)	0·90 (P=·05)	0·98 (P=·05)	13

*Using actual out-turn.

EXPERIMENT II.—LATIN SQUARE IV.—PLANTED 1939—SINGLE STEM

SUMMARY OF RESULTS FOR 1942–52

Yields calculated as cwts. of clean coffee per acre

PARENT				1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 11 years 1942–52	
Mean Yield	No. of years recorded	Selection													Cwts.	Percentages
11·23 ...	7	N	81	0·94	1·56	2·78	0·01	1·28	6·60	1·29	9·08	7·28	18·45	0·48	4·52	82
16·83 ...	7	N	39	0·05	0·61	1·81	0·09	0·62	6·52	2·79	9·65	6·37	23·85	0·67	4·83	88
11·44 ...	8	L	1	0·75	1·65	3·53	0·12	1·59	10·27	1·52	11·28	6·44	19·08	0·26	5·07	92
15·07 ...	4	H	1	0·81	3·78	6·23	2·16	0·88	13·41	6·71	10·39	10·94	24·77	1·93	7·43	135
13·88 ...	7	N	197	0·55	2·19	3·37	0·12	2·61	10·51	2·70	13·30	9·20	23·46	0·95	6·27	114
18·38 ...	7	R	3	0·98	2·16	2·39	0·04	1·34	7·35	1·11	10·51	5·63	21·08	0·33	4·81	88
Mean				0·68	1·91	3·35	0·42	1·39	9·11	2·69	10·70	7·64	21·78	0·77	5·49	100
Standard Error				0·08	0·17	0·25	–	0·26	0·71	0·62	0·91	0·76	1·49	0·19	0·30	5
Significant Difference				0·44 (P=·001)	0·50 (P=·05)	0·74 (P=·05)	–	0·77 (P=·05)	2·10 (P=·05)	1·81 (P=·05)	2·69 (P=·05)	2·24 (P=·05)	4·38 (P=·05)	0·56 (P=·05)	0·87 (P=·05)	16

*Using actual out-turn.

EXPERIMENT II.—RANDOMIZED BLOCK I.—PLANTED APRIL 1939—SINGLE STEM

SUMMARY OF RESULTS FOR 1942-52 CROP

Yields calculated as cwts. of clean coffee per acre

PARENT		Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 11 years 1942–52	
Mean Yield	No. of years recorded													Cwts.	Percentages
11·71	7	R 11	0·83			1·95	1·17	9·65	2·07	16.20	5·37	22·83	0·25	5·60	89
14·02	7	R 2	0·65			1·68	1·32	9·51	3·09	16·80	6·98	20·48	0·85	5·69	90
14·49	4	H 61	0·72			5·94	1·21	13.93	8·99	16·62	7·77	31·75	3·30	8·36	133
Unrecorded		R.R.H.—vigorous	0·87			4·10	1·74	14·27	5·90	15·31	9·39	23·67	3·23	7·30	116
24·22	7	R 13	0·82			1·86	1·34	11·71	4·33	15·71	8·71	21·21	0·55	6·18	98
15·04	4	H 133	0·91			1·87	1·32	11·49	3·76	17·30	8·28	24·81	0·62	6·57	104
10·81	6	J 104	0·80			1·51	1·44	10·38	4·00	16·66	6·13	22·13	0·39	5·93	94
12·13	7	N 106	0·55			1·36	1·24	9·42	3·38	15·54	6·50	21·15	0·21	5·51	87
14·55	7	N 5	0·46			1·47	0·70	7·81	5·49	11·68	9·37	22·53	0·92	5·56	88
Mean			0·74			2·42	1·27	10·90	4·56	15·76	7·61	23·39	1·15	6·30	100
Standard Error			0·12			0·41	0·21	0·71	0·78	0·98	0·84	1·27	0·38	0·22	3
Significant Difference			0·21 (P=0·2)			1·18 (P=·05)	–	2·03 (P=·05)	2·24 (P=·05)	2·80 (P=·05)	2·40 (P=·05)	3·62 (P=·05)	1·08 (P=·05)	0·62 (P=·05)	10

*Using actual out-turn.

EXPERIMENT II.—RANDOMIZED BLOCK II.—PLANTED APRIL 1939—SINGLE STEM

SUMMARY OF RESULTS FOR 1942–52 CROP

Yields calculated as cwts. of clean coffee per acre

PARENT		Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	*1951	*1952	Mean of 11 years 1942–52	
Mean Yield	No. of years recorded													Cwts.	Percentages
13·58	7	N 100	1·27			0·55		10·11	1·50	13·46	6·22	18·90	0·40	5·09	105
13·59	7	N 217	0·58			0·59		9·38	1·74	13·76	8·03	14·63	0·44	4·82	99
13·93	7	R 1	1·13			0·48		9·15	2·11	12·99	6·73	16·08	0·56	4·81	99
12·63	7	N 229	0·89	Crop Failed		0·35		7·79	1·51	14·37	7·23	14·99	0·43	4·62	95
15·19	7	N 34	1·24			0·45		9·33	1·54	12·22	5·99	15·98	0·33	4·51	93
7·69	7	E 325	0·52		Crop Failed	0·63	Crop Failed	6·87	4·27	11·00	7·58	16·73	0·62	4·63	95
12·76	7	N 182	0·83			0·62		6·88	4·49	11·65	8·79	21·68	0·52	5·26	108
14·08	7	N 215	1·03			0·49		8·06	2·44	11·90	6·88	16·61	0·45	4·63	95
12·41	6	J 49	1·37			0·64		10·26	1·63	16·20	5·80	18·75	0·25	5·35	110
Mean			1·10			0·53		8·64	2·36	13·06	7·03	17·15	0·44	4·86	100
Standard Error			0·17			–		0·77	0·54	0·86	0·87	1·05	0·13	0·21	4
Significant Difference (P=·05)			0·53			–		2·22	1·53	2·47	–	3·00	–	–	–

*Using actual out-turn.

KENTS PLOT SELECTIONS—SINGLE STEM

Yields calculated as cwts. of clean coffee per acre

Tree No.	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1938-52
	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	Actual	Actual	16%	Actual	Actual	Mean
KP. 146	25·14	15·36	31·23	7·98	12·90	12·05	17·06	3·82	1·70	11·63	15·31	2·72	2·89	6·06	T	10·99
KP. 147	28·17	3·75	8·23	11·29	1·53	10·78	7·72	12·90	T	6·45	1·26	7·14	4·50	5·43	1·27	7·36
KP. 151	8·60	12·11	7·38	8·06	1·36	3·73	12·30	7·38	4·92	8·99	9·03	8·83	4·33	9·82	2·55	7·29
KP. 154	12·71	17·74	9·33	13·75	0·59	12·30	2·38	11·46	1·10	22·15	30·56	3·78	23·59	3·31	7·64	11·49
KP. 162	10·95	24·66	20·03	0·68	16·12	STUMPED		0·17	0·08	2·38	4·79	0·94	4·67	1·69	1·91	5·94
KP. 163	19·43	22·34	10·95	5·77	13·58	13·24	17·06	3·31	3·82	16·80	13·56	10·67	10·69	13·83	5·41	12·03
KP. 164	9·20	12·28	6·45	5·77	5·01	5·52	17·65	3·22	8·32	25·88	31·04	13·82	31·40	10·47	14·21	13·35
KP. 176	9·33	12·33	15·95	9·08	0·59	2·21	8·74	0·17	4·33	9·08	4·66	7·22	6·36	7·98	0·53	5·97
KP. 204	8·01	14·70	7·81	16·12	1·78	10·78	10·95	10·01	14·68	18·24	3·71	22·24	0·34	8·57	6·05	10·27
KP. 214	6·79	28·17	1·27	11·63	6·36	5·86	5·60	–	0·59	5·18	–	8·89	3·39	4·84	0·21	5·92
KP. 215	3·25	30·35	8·66	6·11	5·09	13·15	28·43	6·28	14·68	21·81	4·78	26·28	5·01	12·10	2·65	12·57
KP. 218	8·26	27·05	6·87	1·78	3·82	9·08	13·24	3·31	8·49	13·24	3·91	22·82	5·43	8·89	5·41	9·45
KP. 226	7·10	27·43	6·19	10·95	–	6·70	6·79	1·78	3·56	4·67	7·86	2·94	5·94	0·75	4·14	6·45
KP. 227	11·90	22·49	16·29	17·48	0·93	12·81	12·64	T	4·92	16·55	0·29	13·42	10·27	4·08	4·56	9·91
KP. 228	13·39	25·35	7·81	8·15	0·85	8·74	7·72	5·69	6·19	13·49	1·70	16·11	5·86	6·60	2·86	8·70
KP. 231	14·37	16·86	25·20	1·02	3·31	11·37	19·26	4·58	5·60	17·23	14·29	24·16	9·33	18·39	2·86	12·52
KP. 260	7·84	12·87	8·32	11·96	2·80	10·52	12·64	11·71	9·25	22·83	1·60	33·76	2·38	18·04	5·52	11·47
KP. 261	9·57	11·54	10·01	3·39	2·72	7·21	10·78	6·28	7·81	7·64	12·26	5·71	10·52	1·34	9·12	7·73
KP. 262	11·20	14·43	12·13	11·63	0·42	20·79	7·64	15·10	10·61	16·97	1·78	8·36	9·16	12·51	7·85	10·71
KP. 263	10·98	19·46	7·01	16·38	1·02	12·13	10·86	4·07	6·79	8·49	5·94	8·79	8·49	9·02	6·89	9·09
KP. 265	13·10	14·62	9·33	9·33	3·31	19·86	13·92	7·64	18·16	14·60	20·13	9·88	23·93	5·67	9·65	12·88
KP. 266	9·90	10·95	8·57	5·43	0·34	6·45	12·47	3·48	17·74	6·53	14·78	5·13	16·97	1·87	5·41	8·40
KP. 281	8·25	12·24	7·72	0·08	0·76	11·80	15·19	0·93	4·92	2·72	6·92	20·50	17·57	8·62	4·14	8·16
KP. 285	9·42	12·30	6·87	18·75	1·53	16·46	15·10	3·14	14·51	9·50	12·39	15·50	19·77	3·84	13·68	11·52
KP. 289	8·35	11·83	10·10	13·41	0·17	13·58	13·15	3·48	7·64	21·38	2·68	19·11	3·31	14·13	5·73	10·00
KP. 352	9·05	22·01	0·68	14·17	–	11·63	6·96	4·92	6·02	11·12	18·05	10·65	20·79	14·55	11·46	10·80
KP. 362	7·41	13·10	11·12	19·52	3·73	15·78	3·90	11·29	3·65	15·02	22·79	7·01	22·49	3·73	20·58	12·07
KP. 405	6·74	14·70	2·46	2·80	2·72	12·13	15·02	5·26	10·10	17·23	28·80	18·00	24·52	8·67	14·00	12·21
KP. 406	9·62	10·93	9·33	4·16	4·33	14·93	14·09	6·87	10·78	11·37	28·49	14·80	19·09	8·37	9·76	11·79
KP. 409	9·88	13·88	5·35	9·25	3·99	18·16	10·44	8·83	11·80	10·78	19·39	11·88	23·17	5·53	8·80	11·41
KP. 412	10·01	13·69	7·64	13·58	2·80	9·84	7·89	8·57	2·63	12·81	12·61	13·39	18·67	6·37	8·38	9·93
KP. 414	10·52	11·76	7·02	6·62	1·78	10·61	6·70	6·45	7·38	8·74	24·77	7·83	23·76	1·73	6·05	9·45
KP. 423	10·49	14·15	10·95	17·99	5·94	29·62	3·99	20·03	7·55	29·02	8·16	19·35	4·84	23·54	11·77	14·49
KP. 466	8·68	12·36	6·78	14·51	0·34	15·10	8·32	9·08	1·19	14·51	12·38	22·93	10·01	9·06	11·77	10·47
KP. 512	10·27	11·15	2·89	15·78	2·12	15·78	10·36	7·04	6·62	9·25	18·16	22·08	6·36	12·47	0·11	10·03
KP. 518	5·74	14·87	2·29	13·07	3·99	10·52	10·18	6·70	1·78	8·57	8·68	2·70	14·34	3·17	7·11	7·58
KP. 532	8·51	12·51	9·50	19·52	3·14	13·92	11·96	1·10	4·75	15·53	20·47	14·38	15·44	1·10	7·32	10·61
KP. 683	18·35	12·47	6·62	15·61	2·04	16·29	4·24	14·93	0·51	9·25	11·36	15·67	12·30	17·51	0·95	10·54
KP. 685	11·56	12·83	6·11	11·96	0·85	12·98	6·53	15·95	3·39	15·02	10·63	24·47	10·18	20·69	1·27	10·96
VC. 276	7·41	14·19	14·85	6·70	8·32	8·83	9·08	4·07	9·59	7·13	16·62	2·27	13·75	–	–	–
VC. 363	7·64	14·91	5·60	9·50	12·47	12·73	0·59	13·32	5·35	3·31	15·96	0·08	10·95	–	–	–
VC. 364	6·93	14·90	8·40	8·49	13·49	6·28	0·34	14·09	6·02	7·89	21·91	1·20	6·02	–	–	–

T=Trace.

EXPERIMENT I—SELECTIONS

Yields calculated as cwts. of clean coffee per acre

Tree No.	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	Mean
	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	Actual	Actual	Actual	Actual	Actual	1938-52
11	8·99	4·56	7·81	21·30	8·23	33·35	–	41·66	0·85	26·39	10·37	10·35	–	4·54	3·50	12·13
33	4·41	13·85	3·56	22·15	6·53	25·71	–	54·05	–	29·11	43·09	11·21	14·13	17·27	1·17	16·42
55	14·09	3·79	13·92	13·24	9·84	23·59	–	38·27	2·04	49·73	1·28	25·08	2·34	19·27	–	14·43
71	14·17	1·64	10·61	21·55	16·63	23·93	1·19	44·89	0·51	42·26	1·15	20·04	1·17	19·59	2·02	14·76
179	13·32	2·04	6·53	21·30	2·12	37·75	3·05	39·03	–	25·03	1·47	6·88	1·29	6·65	–	11·10
188	15·51	–	10·27	15·02	11·96	17·14	1·27	44·21	0·59	45·06	5·71	24·94	0·88	17·38	1·91	14·19
197	13·72	1·36	10·86	14·43	7·21	21·64	8·74	50·26	0·59	27·24	20·80	13·43	3·17	15·87	0·11	13·89
200	13·88	0·08	9·25	13·41	12·98	26·98	–	45·40	–	38·36	3·39	24·22	0·82	17·45	–	13·75
255	13·85	–	10·52	19·86	3·05	19·77	–	49·90	–	41·24	4·14	29·25	2·52	18·66	5·09	14·52
339	16·97	0·17	13·24	7·81	11·96	27·83	–	42·85	1·95	34·54	17·35	22·38	2·17	15·86	–	14·34
448	15·24	1·10	14·60	10·10	5·18	26·48	–	46·16	6·70	46·08	1·65	31·55	T	15·04	0·21	14·67

T=Trace

EXPERIMENT III.—CLONES v. SEEDLINGS—PLANTED 1938

This experiment was originally designed to compare clones (rooted cuttings) with seedlings of the same parent, both by themselves and as root-stocks grafted with scions from another single mother-tree. The trees are pruned on the single stem system and the area is lightly shaded with *Albizzia maranguensis*. Although planted in 1938 (as a 4 x 4 latin square) difficulties regarding the technique of grafting in the field were experienced. The advent of the war, and consequent shortage of staff, aggravated the position, and even now there are a number of missing trees. In an endeavour to obtain further evidence regarding the respective merits of rooted cuttings and seedlings of the same parents (cf. Experiment IIIA below), it was decided to commence recording the yields of this experiment in 1948. Ten mother-trees are represented. Due allowance has been made in the analysis for the missing trees.

EXPERIMENT III:—ANNUAL AND MEAN YIELDS FOR FIVE YEARS, 1948-52, EXPRESSED AS CWTS. OF CLEAN COFFEE PER ACRE

	*1948	*1949	*1950	*1951	1952*	Mean of 5 years 1948–52
Clones	8·83	15·75	9·09	14·37	2·00	10·16
Seedlings	12·16	16·12	12·80	15·08	2·98	11·75
Mean	10·50	15·94	10·94	14·73	2·49	10·96
Standard Error	1·80	1·87	1·63	1·74	0·30	0·14
Significant Difference	–	–	–	–	–	0·62

*Using actual out-turn.

Seedlings have given a significantly higher yield than clones in this Experiment.

EXPERIMENT IIIA.—CLONES v. SEEDLINGS—PLANTED 1942

This is designed to give a straight comparison between clones (rooted cuttings) and seedling progeny of the same mother-trees; the experiment is laid out as randomized blocks repeated ten times; the trees are pruned on the single stem system. Shade is afforded by *Albizzia stipulata* and *Maesopsis eminii*, with *Albizzia maranguensis* as the permanent shade tree. As in Experiment III there are a number of missing trees for which allowance has been made in the analysis. This correction is for differences in numbers only. The records of this experiment were kept by plots up to 1949. Individual tree yields were recorded in 1950 and 1951. Nine mother-trees are represented.

EXPERIMENT IIIA.—ANNUAL AND MEAN YIELDS FOR THE EIGHT YEARS 1945-52 EXPRESSED AS CWTS. OF CLEAN COFFEE PER ACRE

	1945 16%	1946	*1947	*1948	*1949	*1950	*1951	1952*	Mean of 8 years 1945-52 Cwts.
Clones	3·17	Crop Failed	5·45	8·48	10·91	13·11	12·84	3·33	6·93
Seedlings	2·06		4·66	9·44	9·43	14·69	10·29	4·61	6·88
Mean	2·62		5·06	8·96	10·17	13·90	11·56	3·97	6·91
Standard Error	0·23		0·17	0·46	0·53	0·90	0·80	0·27	0·17
Significant Difference ...	0·75		0·55	–	–	–	–	0·87	–

*Using actual out-turn.

For the eight-year period there is no significant difference in yield.

EXPERIMENT V.—MULCH, COMPOST AND NITROGEN—PLANTED 1940

This is a partially confounded 3 x 3 x 3 factorial experiment designed to determine the effects on yield of mulch, compost, and Sulphate of ammonia at three quantity levels separately and in all combinations. The material used for mulching is dried elephant grass. The area is unshaded; the trees, which are unselected clonal material, are pruned on the single stem system.

Treatments (per tree):

Mulch : M0 = Nil.
M1 = 40 lb. dried Elephant Grass.
M2 = 80 lb. dried Elephant Grass.

Compost : C0 = Nil.
C1 = 1 debe (petrol tin) compost.
C2 = 2 debes (petrol tin) compost.

		1940-42	1943-45	1946-52
Nitrogen :	N0 =	Nil	Nil	Nil
	N1 =	1 oz. Sulphate of Ammonia.	2 oz. Sulphate of Ammonia.	3 oz. Sulphate of Ammonia.
	N2 =	2 oz. Sulphate of Ammonia.	4 oz. Sulphate of Ammonia.	6 oz. Sulphate of Ammonia.

In 1952 the mulch was applied just prior to the long rains, in previous years it was applied after these rains. Compost was applied prior to the rains, and lightly forked in, as in previous years; the application of Sulphate of Ammonia was made as in previous years, i.e. in May, after approximately 15 inches of rain.

The annual yields and also the summary for the years 1942-52 are given below.

EXPERIMENT V.—MEAN YIELD FOR THE ELEVEN YEARS 1942-52 EXPRESSED AS CWTS. OF CLEAN COFFEE PER ACRE

	N0			N1			N2		
	C0	C1	C2	C0	C1	C2	C0	C1	C2
M0	8·22	9·87	9·87	9·45	9·93	10·06	9·62	9·30	9·84
M1	8·76	10·16	10·14	9·59	9·10	9·85	8·74	10·21	9·59
M2	9·64	9·30	9·56	9·02	9·20	8·67	8·27	9·53	9·15

Standard Error ± 0·42

EXPERIMENT V—MULCH AND COMPOST

	C0	C1	C2	Mean
M0 ...	9·10	9·71	9·94	9·58
M1 ...	9·04	9·84	9·88	9·59
M2 ...	8·99	9·35	9·15	9·17
Mean * ...	9·04	9·63	9·66	9·45

Standard Error for marginal means ± 0·14
*Significant Difference for marginal means ± 0·40
Standard Error for the body of table ± 0·24

EXPERIMENT V—MULCH AND NITROGEN

	N0	N1	N2	Mean
M0 ...	9·33	9·82	9·59	9·58
M1 ...	9·71	9·53	9·53	9·59
M2 ...	9·52	8·98	9·00	9·17
Mean ...	9·52	9·44	9·37	9·45

Standard Error for marginal means ± 0·14
Standard Error for the body of table ± 0·24

EXPERIMENT V—COMPOST AND NITROGEN

	N0	N1	N2	Mean *
C0	8·88	9·36	8·88	9·04
C1	9·79	9·42	9·69	9·63
C2	9·87	9·54	9·54	9·66
Mean ...	9·52	9·44	9·37	9·45

Standard Error for marginal means ± 0·14
*Significant Difference for marginal means ± 0·40
Standard Error for the body of table ± 0·24

EXPERIMENT V.—PLOT YIELDS EXPRESSED AS CWTS. OF CLEAN COFFEE PER ACRE

Mulch	Compost	Nitrogen	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	Mean 1942–52
0	0	0	1·26	0·29	0·45	11·23		7·39	22·75	7·14	18·04	10·62	11·33	8·22
0	0	1	1·28	0·55	0·58	11·49		9·27	25·17	8·57	21·22	11·55	14·40	9·45
0	0	2	1·00	0·36	0·92	13·65		11·54	21·57	13·39	14·85	14·32	14·25	9·62
0	1	0	1·46	0·54	0·95	17·18		12·98	22·39	11·32	18·10	11·34	12·36	9·87
0	1	1	1·42	0·51	1·17	14·21		15·14	17·79	15·15	16·02	13·16	14·69	9·93
0	1	2	1·35	0·46	0·65	10·39		11·48	19·06	15·34	16·83	12·04	14·95	9·30
0	2	0	1·71	0·68	1·03	17·61		10·58	24·69	11·62	18·37	8·14	14·56	9·87
0	2	1	1·32	0·37	1·16	14·16		12·95	20·09	13·71	17·32	13·78	16·10	10·06
0	2	2	0·42	0·36	0·64	13·29		11·92	17·09	16·02	16·55	16·77	14·88	9·84
1	0	0	1·85	0·49	0·88	15·27		8·89	24·76	9·61	14·12	10·10	10·39	8·76
1	0	1	1·51	0·59	1·43	14·32		11·30	21·01	11·90	16·71	16·28	10·54	9·59
1	0	2	1·48	0·39	1·20	12·83		10·42	17·30	12·67	14·67	12·73	12·11	8·74
1	1	0	2·31	0·60	0·97	15·84		12·95	20·41	16·09	16·25	14·09	12·27	10·16
1	1	1	2·18	0·78	0·82	13·15		10·00	20·83	12·13	16·47	11·40	12·60	9·10
1	1	2	1·42	0·46	1·43	16·17		13·13	22·44	14·81	14·99	13·56	13·85	10·21
1	2	0	1·99	0·64	1·49	13·53		15·86	17·45	14·65	18·22	13·96	14·02	10·14
1	2	1	1·52	0·47	0·70	13·01		15·14	16·49	15·15	17·49	14·43	13·97	9·85
1	2	2	1·65	0·57	1·04	12·18		10·63	22·38	11·91	18·58	12·26	14·83	9·59
2	0	0	1·86	0·52	1·01	14·09		14·51	20·91	14·42	14·04	12·29	12·37	9·64
2	0	1	1·65	0·56	1·28	13·52		12·22	20·17	14·11	12·86	12·41	10·67	9·02
2	0	2	1·38	0·31	0·87	9·47		9·70	19·14	14·18	12·31	14·00	10·06	8·27
2	1	0	1·24	0·51	1·15	13·34		10·48	20·81	14·16	15·02	12·51	13·07	9·30
2	1	1	1·64	0·31	0·76	14·41		14·09	17·81	13·14	12·29	15·88	11·23	9·20
2	1	2	1·56	0·17	0·92	15·30		12·80	17·41	14·63	15·71	11·62	14·36	9·53
2	2	0	1·38	0·54	1·24	14·06		11·96	18·82	13·61	18·18	11·11	14·38	9·56
2	2	1	1·66	0·61	1·07	10·01		10·81	22·81	10·92	16·05	10·77	10·75	8·67
2	2	2	1·67	0·53	1·04	12·96		13·30	16·93	14·30	14·56	12·85	12·44	9·15

Crop Failed

EXPERIMENT XV.—IRRIGATION AND MULCH—PLANTED 1940

This is a complex confounded factorial experiment laid out as an 8 x 8 quasi-latin square. It is designed to investigate the effects of irrigation and mulch, both separately and in combination, on coffee culture. The material used for mulching is dried banana trash. The experiment is planted with four different clones, from unselected mother-trees, and the behaviour of these clones is also recorded. They are pruned on the single stem system. The area is unshaded.

The treatments were modified as from July, 1951:

	1940 to June, 1951	July, 1951 onwards
Irrigation:		
0	= Nil	= As before.
1	= Made up to 2 inches of effective rainfall monthly	= As before
2	= Made up to 4 inches of effective rainfall monthly	= 1 inch monthly
3	= Made up to 2 inches of effective rainfall fortnightly	= 2 inches from September to March inclusive
Mulch:		
0	= Nil	= As before
1	= Banana trash 40 lb. per tree at end of long rains	= As before
2	= Banana trash 80 lb. per tree at end of long rains	= 20 lb. in June
3	= Banana trash 40 lb. per tree at end of both long and short rains	= 20 lb. in June and December

Clone:

1 = KIL 50
2 = KIL 98
3 = KIL 48
4 = KIL 10

The annual yields for the various treatments are given below, together with the summary for the years 1942-51 and the yields for 1952.

EXPERIMENT XV.—PLOT YIELDS

Annual Yields expressed as cwts. of Clean Coffee per Acre

Irrigation	Mulch	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	Mean 1942–51	1952
0	0	0·38	2·22	0·05	2·61	0·30	2·19	15·47	4·26	11·67	7·31	4·57	7·95
0	1	1·42	5·76	1·72	1·97	1·21	8·31	20·81	8·88	14·39	7·90	7·24	10·26
0	2	1·61	6·11	1·88	1·21	0·44	8·28	21·14	7·93	14·86	8·41	7·21	9·35
0	3	1·35	5·53	2·67	1·10	0·70	7·48	17·29	9·48	13·76	6·86	6·60	10·75
1	0	0·66	4·95	2·55	1·54	3·42	12·43	12·33	15·00	7·33	9·04	6·93	9·53
1	1	1·80	8·29	2·99	0·86	4·33	17·76	16·63	18·79	8·31	9·19	8·89	11·82
1	2	2·03	9·32	2·87	1·80	1·95	14·65	16·97	14·22	7·87	9·08	8·06	8·47
1	3	1·76	7·97	3·24	1·34	4·20	16·69	15·75	15·20	9·85	8·90	8·51	11·46
2	0	0·86	6·46	2·94	1·56	3·75	12·54	11·06	18·05	4·92	9·55	7·20	7·23
2	1	1·72	9·57	3·26	1·04	3·68	15·10	14·29	18·10	6·84	10·79	8·44	12·74
2	2	2·43	7·94	2·33	0·97	3·00	15·10	16·25	16·17	6·61	9·98	8·08	12·27
2	3	1·70	6·87	3·46	1·17	3·14	15·21	17·32	13·76	7·92	9·84	8·05	11·27
3	0	1·10	5·11	2·85	1·07	1·92	12·55	8·39	16·04	5·58	5·69	6·10	5·92
3	1	1·96	7·44	2·76	0·20	3·85	17·97	14·25	15·05	10·58	8·31	8·39	13·03
3	2	2·22	7·02	4·27	0·54	3·42	18·08	15·37	16·12	9·20	9·03	8·52	11·92
3	3	1·59	5·75	4·08	0·70	2·96	17·40	15·39	12·87	8·78	8·46	7·80	10·89

The yields for 1952 are given above as a matter of interest, but, as stated in the text, this experiment is now treated as an observation plot, i.e. from 1952 onwards.

EXPERIMENT XIII.—METHOD OF PRUNING—PLANTED DECEMBER, 1935

This experiment is laid out as 3 x 3 latin square, repeated three times in different parts of the Station. It is designed to compare three systems of pruning arabica coffee. Two of the replicates are lightly shaded with *Albizzia maranguensis;* the third is unshaded. The experiment is planted with seedling material.

TREATMENTS:

S = Single stem.
M/3 = Multiple stem—3 suckers.
M/A = Multiple stem—Agobiada—3 suckers.

The yearly results, together with the summary, for the period 1938-52 are shown on page 34

EXPERIMENT XIII

ANNUAL AND MEAN YIELDS FOR THE FIFTEEN YEARS 1938–52 EXPRESSED AS CWTS. OF CLEAN COFFEE PER ACRE

	*1938	*1939	*1940	*1941	*1942	*1943	*1944	*1945	*1946	*1947	*1948	*1949	*1950	*1951	*1952	Mean of 15 years 1938-52	
Treatments:																Cwts.	Per-centages
Single stem	Fly Crop	1·982	2·996	7·290	3·951	5·318	5·319	9·389	1·04	20·492	9·318	15·052	12·362	15·81	11·35	8·00	89
Multiple stem, 3 suckers ...		2·348	11·928	12·962	12·034	17·238	5·677	7·079	2·30	29·578	5·056	12·701	13·446	16·24	10·01	10·59	118
Agobiada, Multiple stem, 3 suckers		0·407	6·607	6·370	7·494	13·079	4·992	8·028	0·90	17.329	10·987	13·840	7·272	16·53	10·20	8·21	92
Mean		1·579	7·177	8·874	7·840	11·878	5·329	8·232	1·41	22·467	8·454	13·864	10·745	16·19	10·52	8·94	100
Standard Error		0·301	0·493	0·700	0·401	0·843	0·127	1·013	0·312	0·410	0·764	0·552	2·108	1·11	0·78	0·27	3
Significant Difference (P=·05) ...		1·043	1·707	2·422	1·389	2·918	0·440	–	1·256	1·419	2·642	–	–	–	–	0·92	10

*Using actual out-turn

For the whole period of the experiment the multiple stem system has outyielded that of the single stem system and the difference is significant at P=0·001.

EXPERIMENT XX

This experiment is laid out as randomized blocks repeated six times. It is designed to study the effects of the time of pruning on coffee grown on the single stem system.

The coffee in which the experiment is being carried out consists of seedlings of both Kents and Bourbon, and was planted in 1936. It is well shaded by *Albizzia maranguensis* and *Rauvolfia inebrians*.

The treatments were commenced at the end of 1948.

TREATMENTS:

A. Pruned during month in which harvesting is completed.
B. Pruned one month later than A.
C. Pruned one month later than B.
D. Pruned one month later than C.
E. Pruned one month later than D.
F. Pruned one month later than E.

EXPERIMENT XX

ANNUAL AND MEAN YIELDS FOR THE YEARS 1949-52, EXPRESSED AS CWTS. OF CLEAN COFFEE PER ACRE

	*1949	*1950	*1951	*1952	Mean of 4 years 1949–52	
					Cwts.	Percentage
A.—Pruned during month in which harvesting completed	12·93	8·79	17·61	6·88	11·55	126
B.	11·60	7·14	15·61	6·17	10·13	110
C.	9·53	8·67	11·71	6·87	9·19	100
D. Successive months	8·24	8·31	13·24	5·61	8·86	97
E.	8·85	5·44	12·69	5·77	8·19	89
F.	9·53	5·66	9·59	3·95	7·18	78
Mean	10·11	7·33	13·41	5·87	9·18	100
Standard Error	0·79	1·65	0·99	0·76	0·54	6
Significant Difference (P=·05)	2·30	—	2·89	—	1·57	17

*Using actual out-turn.

STATEMENT SHOWING GRADES AND CLASSIFICATION OF THE 1952-53 CROP

	Tons
Total estimated crop expressed as clean coffee	18·67
This total is made up as follows:—	
Lots 1-4 inclusive	14·78
Floaters	0·22
Clean coffee equivalent to 3,931 lb. seed	1·40
Coffee samples	1·17
Buni...	0·43
Maragojipe clean	0·20
Robusta and Excelsa 1,329 lb. parchment = 1,063 lb. clean ...	0·47
	18·67

The grading and classification of lots 1-4 amounting to 14·78 tons of clean coffee was:—

GRADING	lb.	Percentage	CLASSIFICATION	lb.	Percentage
AA ...	8,803	26·59	1...	—	—
A ...	15,177	45·84	2...	—	—
PB ...	2,506	7·57	3...	6,090	18·39
B ...	3,710	11·21	4...	18,679	56·42
E ...	248	0·75	5...	3,243	9·80
C ...	496	1·50	6...	2,190	6·61
T ...	375	1·13	7...	242	0·73
TT ...	1,572	4·75	8...	427	1·29
HP ...	220	0·66	9...	—	—
			10...	1,585	4·79
			11...	538	1·63
			12...	113	0·34
	33,107	100%		33,107	100%
=	14·78 Tons				

MONTHLY RAINFALL FROM SEPTEMBER 1944 TO END OF AUGUST 1952 IN INCHES

	September 1944 to end of August 1945	September 1945 to end of August 1946	September 1946 to end of August 1947	September 1947 to end of August 1948	September 1948 to end of August 1949	September 1949 to end of August 1950	September 1950 to end of August 1951	September 1951 to end of August 1952
September ...	2·42	0·20	7·34	1·23	0·30	0·33	1·87	0·24
October	3·15	0·05	4·71	1·27	2·51	0·69	0·80	2·40
November ...	3·10	4·66	1·13	0·93	1·65	0·26	0·88	8·65
December ...	5·14	0·30	2·19	1·31	6·19	1·38	0·91	4·89
January	1·72	0·02	2·01	0·46	1·79	2·06	4·19	3·63
February ...	1·39	1·14	0·72	0·71	4·17	3·01	2·58	1·17
March	4·85	0·57	3·37	2·72	0·10	7·09	3·20	3·06
April	15·19	16·50	18·45	14·50	9·34	16·20	20·45	11·66
May	21·34	22·74	25·73	15·56	10·64	24·96	19·38	12·65
June	3·45	2·54	10·97	2·93	0·92	5·09	7·20	3·03
July	3·15	0·59	1·43	1·53	1·86	1·81	2·09	1·38
August	1·33	1·03	1·38	0·44	0·82	0·88	1·60	0·74
Total (in inches)...	66·23	50·74	89·43	43·59	40·29	63·76	65·15	53·50

Rainfall for remaining months of 1952. September 3·29. October 0·08.
November 3·53. December 0·39.